

UNITED STATES PATENT APPLICATION

OF

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FOR

DRUM TYPE WASHING MACHINE

[0001] This application claims the benefit of Korean Application(s) No. 10-2002-0075351 filed on November 29, 2002, which is/are hereby incorporated by reference.

BACKGROUND OF THE INVENTION

5 Field of the Invention

[0002] The present invention relates to a washing machine, and more particularly, to a drum type washing machine, which effectively attenuates a vibration transferred to a tub.

Discussion of the Related Art

[0003] In a general drum type washing machine, a drum holding the laundry, water,
10 and detergent inside is rotated to lift the laundry up by protrusions to perform washing using the shock energy of the laundry falling down and a frictional force thereof.

[0004] Such a drum type washing machine avoids causing damage to the laundry and prevents the laundry from being entangled, thereby prevailing in use gradually.

[0005] A construction of a drum type washing machine according to a related art is
15 explained by referring to the attached drawing as follows.

[0006] FIG. 1 is a schematic cross-sectional view of a drum type washing machine according to a related art.

[0007] Referring to FIG. 1, in a drum type washing machine according to a related art, a cabinet 2 made of a metal-based material forms an exterior. An entrance is formed at a front
20 side of the cabinet 2, and a door 18 is installed at the entrance to prevent a laundry from popping out. And, a tub 6 supported by a spring 4 is installed in the cabinet 2 to hold water.

[0008] A drum 12 in which the laundry and detergent are put is rotatably installed in the tub 6. A rotational shaft 8 coupled with a motor 10 is installed in a rear side of the drum 12 to transfer a driving force to the drum 12. And, a plurality of lifts 14 are installed on an

inside of the drum 12 to pull up the laundry to fall.

[0009] Meanwhile, a gasket 20 formed of such an elastic material as rubber is installed between the door 18 and the tub 6. The gasket 20 alleviates a shock generated from a rotation of the drum 12 as well as makes the door 18 airtight to prevent the water from leaking.

5 [0010] A damper 40 is installed at one side under the tub 6. The damper 40 attenuates the vibration transferred to the tub 6 through the rotational shaft 8 while the washing machine operates.

[0011] Moreover, a control panel 22 for controlling an operation of the drum type washing machine is installed on a top of the cabinet 2. A water supply hose 24, a water supply
10 valve 26, and a detergent box 28 are installed in an upper part of the cabinet 2 to supply the water and detergent to the tub 6. And, a drain pump 30 and a drain hose 32 are installed at one side under the tub 6 to circulate or discharge the water.

[0012] However, the related art drum type washing machine has the following problems or disadvantages.

15 [0013] First of all, the damper, which is installed at one side under the tub, attenuates vertical and horizontal vibrations but fails to attenuate a front-to-rear vibration.

[0014] Hence, when the tub vibrates in front-to-rear directions, the vibration is not attenuated to cause damage to internal parts such as gasket and the like.

[0015] Moreover, the front-to-rear vibration of the tub affects the operation of the
20 drum and motor in washing, rinsing, and dewatering, whereby the drum type washing machine is unstably driven.

SUMMARY OF THE INVENTION

[0016] Accordingly, the present invention is directed to a drum type washing machine

that substantially obviates one or more of the problems due to limitations and disadvantages of the related art.

[0017] An object of the present invention, which has been devised to solve the foregoing problem, lies in providing a drum type washing machine, which effectively
5 attenuates a vibration transferred to a tub.

[0018] Additional features and advantages of the invention will be set forth in the description which follows, and in part will be apparent to those having ordinary skill in the art upon examination of the following or may be learned from a practice of the invention. The objectives and other advantages of the invention will be realized and attained by the subject
10 matter particularly pointed out in the specification and claims hereof as well as in the appended drawings.

[0019] To achieve these objects and other advantages in accordance with the present invention, as embodied and broadly described herein, there is provided a drum type washing machine including a cabinet forming an exterior, a tub in the cabinet to hold water, a drum in
15 the tub to hold a detergent and the water, a rotational shaft penetrating into the tub to be coupled with a rear side of the drum, a motor transferring a driving force to the rotational shaft, and a damper provided between the tub and the cabinet to attenuate vertical, horizontal, and front-to-rear vibrations transferred to the tub by a rotation of the drum.

[0020] In this case, the damper includes a cylinder and a piston inserted in the
20 cylinder to reciprocate. A cylinder holder is provided at one end of the cylinder to be coupled with the tub and a piston holder is provided at one end of the piston to be coupled with the cabinet.

[0021] And, the cylinder and piston holders are hinge-coupled with fixing ends provided at the tub and cabinet, respectively.

[0022] Meanwhile, the damper preferably includes first and second dampers provided at left and right sides under a bottom of the tub to attenuate the vertical and horizontal vibrations and a third damper provided in rear of the tub to attenuate the front-to-rear vibration.

5 [0023] In this case, each of the first to third dampers comprises a cylinder and a piston inserted in the cylinder to reciprocate. A cylinder holder is provided at one end of the cylinder to be coupled with the tub and a piston holder is provided at one end of the piston to be coupled with the cabinet.

10 [0024] And, the cylinder and piston holders are hinge-coupled with fixing ends provided at the tub and cabinet, respectively.

[0025] In another aspect of the present invention, there is provided a damper of a drum type washing machine including first and second dampers provided at left and right sides under a bottom of the tub to attenuate the vertical and horizontal vibrations and a third damper provided in rear of the tub to attenuate the front-to-rear vibration.

15 [0026] In this case, each of the first to third dampers comprises a cylinder and a piston inserted in the cylinder to reciprocate. A cylinder holder is provided at one end of the cylinder to be coupled with the tub and a piston holder is provided at one end of the piston to be coupled with the cabinet.

20 [0027] And, the cylinder and piston holders are hinge-coupled with fixing ends provided at the tub and cabinet, respectively.

[0028] It is to be understood that both the foregoing explanation and the following detailed description of the present invention are exemplary and illustrative and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate embodiment(s) of the invention and together with the description serve to explain the principle of the invention. In the drawings:

[0030] FIG. 1 is a schematic cross-sectional view of a drum type washing machine according to a related art;

[0031] FIG. 2 is a cross-sectional view of a drum type washing machine according to the present invention;

[0032] FIG. 3 is a perspective view of a drum type washing machine having a damper according to the present invention, in which an internal view is partially shown; and

[0033] FIG. 4 is a cross-sectional view of a damper according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

[0034] Reference will now be made in detail to the preferred embodiment(s) of the present invention, examples of which are illustrated in the accompanying drawings. Throughout the drawings, like elements are indicated using the same or similar reference designations where possible.

[0035] FIG. 2 is a cross-sectional view of a drum type washing machine according to the present invention.

[0036] Referring to FIG. 2, in a drum type washing machine according to the present invention, a cabinet 52 having an opening at a front side forms an exterior. The opening is to put in/out a laundry and is closed/open by a door 68 rotatably installed at the cabinet 52.

[0037] A tub 56 connected to the cabinet 52 by a spring 54 is installed in the cabinet

2, and a drum 62 in which the laundry and detergent are put is rotatably installed in the tub 56.

[0038] A plurality of lifts 64 are installed on an inside of the drum 12 to pull up the laundry to a predetermined height to fall. A rotational shaft 58 coupled with a motor 60 is installed in a rear side of the drum 62 to transfer a driving force to the drum 62.

5 [0039] A control panel 72 for controlling an operation of the drum type washing machine is installed on a top of the cabinet 52. A water supply hose 74, a water supply valve 76, and a detergent box 78 are installed in an upper part of the cabinet 52 to supply the water and detergent to the tub 56 and drum 62. And, a drain pump 80 and a drain hose 82 are installed under the tub 56 to discharge the water.

10 [0040] And, a gasket 70 formed of such an elastic material as rubber is installed between the door 68 and the tub 56. The gasket 70 absorbs a shock transferred to the tub 56 when the drum 62 rotates as well as prevents the water from leaking through the door 68.

[0041] In the above-constructed drum type washing machine, since the drum 62 is rotated by the rotational shaft 58 on washing, rinsing, and dewatering, the driving force of the motor 60 is transferred to the drum 62 to generate vibrations appearing on the tub 56 and drum 62.

15 [0042] Hence, a damper 90 is installed between the tub 56 and the cabinet 52 to attenuate the vibrations. And, the damper 90 is installed to attenuate front-to-rear vibrations of the tub 56 as well as vertical and horizontal vibrations, which are generated from the rotation of the drum 62.

20 [0043] The damper 90 is explained in detail by referring to the attached drawing as follows.

[0044] FIG. 3 is a perspective view of a drum type washing machine having a damper according to the present invention, in which an internal view is partially shown.

[0045] Referring to FIG. 3, the damper 90 includes first and second dampers 91a and 91b attenuating vertical and horizontal vibrations and a third damper 92 attenuating a front-to-rear vibration.

[0046] The first and second dampers 91a and 91b are installed at left and right sides under the tub 56, respectively, and the third damper 92 is installed in rear of a bottom of the tub 56. Hence, if the tub 56 vibrates horizontally or vertically, both of the first and second dampers 91a and 91b vibrate together. If the tub 56 vibrates in front-to-rear directions, the third damper 92 vibrates together. Hence, the vertical and horizontal vibrations of the tub 56 are attenuated by the first and second dampers 91a and 91b, and the front-to-rear vibration is attenuated by the third damper 92.

[0047] Of course, an installation position of the damper 90 is versatile. For example, the third damper 92 can be installed in front of the bottom of the tub 56 or in each of front and rear of the bottom of the tub 56. Moreover, at least four dampers 90 can be installed to attenuate vibrations more effectively.

[0048] FIG. 4 is a cross-sectional view of a damper according to the present invention.

[0049] Referring to FIG. 4, the damper 90 includes a cylinder 93 and a piston 94. The piston 94 is inserted in the cylinder 93 to reciprocate inside the cylinder 93 according to the vibrations of the tub 56. In this case, a frictional force is generated between the piston 94 and the cylinder 93 to attenuate the vibrations transferred from the tub 56.

[0050] A cylinder holder 97 is provided at one end of the cylinder 93 to be coupled with the tub 56, and a piston holder 98 is provided at one end of the piston 94 to be connected to the cabinet 52.

[0051] The cylinder and piston holders 97 and 98 are preferably hinge-coupled with the tub and cabinet 56 and 52, respectively. For this, fixing ends 99 are formed at the bottom

of the tub 56 and a bottom inside of the cabinet 52 to be coupled with the cylinder holder 97 and the piston holder 98, respectively.

[0052] Each of the fixing ends 99 includes a pair of protrusions leaving a predetermined distance from each other, and the piston or cylinder holder 98 or 97 is installed
5 between the protrusions. Moreover, a hole to which a hinge pin 96 is fitted is formed at each of the fixing ends 99, cylinder holder 97, and piston holder 98.

[0053] Hence, the cylinder and piston holders 97 and 98 are fixed to the fixing ends 99 by the corresponding hinge pins 96, respectively.

[0054] Of course, the cylinder and piston holders 97 and 98 can be directly coupled
10 with the tub and cabinet 56 and 52 by screws and the like, respectively.

[0055] An operation of the above-constructed drum type washing machine according to the present invention is explained as follows.

[0056] First of all, once a power is applied to the drum type washing machine, the control panel turns on the water supply valve 76 according to an amount of the input laundry
15 to supply water to the tub 56. The water supply is performed via the water supply hose 74.

[0057] After the tub 56 is sufficiently filled with the supplied water, a washing step is executed so that the drum 62 is rotated by the motor 60. In this case, the input laundry in the drum 62 is lifted up to fall down for washing.

[0058] After completion of the washing step, a draining step is initiated to discharge
20 the used water in the tub 56. In this case, the used water is drained via the drain hose 82 outside the drum type washing machine.

[0059] After completion of the draining step, new water is supplied to the tub 56 and the drum 62 is then rotated to perform a rinsing step for rinsing the laundry. After completion of the rinsing step, the draining step is repeated.

[0060] Finally, after completion of the draining or washing step, the drum 56 is rotated at high speed to remove water contents involved in the laundry.

[0061] Thus, in the washing, rinsing, and dewatering steps, the rotational shaft 58 receiving the driving force from the motor 60 rotates the drum 62.

5 [0062] In such a case, the tub 56 vibrates horizontally, vertically, and in front-to-rear directions. The horizontal and vertical vibrations of the tub 56 are alleviated by the first and second dampers 91a and 91b, while the front-to-rear vibration of the tub 56 is alleviated by the third damper 92.

[0063] Accordingly, the drum type washing machine according to the present
10 invention has the following effects or advantages.

[0064] First of all, the first and second dampers attenuate the vertical and horizontal vibrations of the tub and the third damper attenuates the front-to-rear vibration, whereby the vibrations transferred to the tub are effectively reduced.

[0065] Secondly, the drum type washing machine according to the present invention
15 reduces the vibrations of the tub to prevent damage of the internal parts such as the gasket and the like.

[0066] Thirdly, the drum type washing machine according to the present invention enables to be stably driven in washing, rinsing, and dewatering as the vibrations are reduced.

[0067] It will be apparent to those skilled in the art that various modifications and
20 variations can be made in the present invention without departing from the spirit or scope of the invention. Thus, it is intended that the present invention cover such modifications and variations, provided they come within the scope of the appended claims and their equivalents.